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October 17, 2008

Mr. Sam Chummar
Remedial Project Manager
U.S. Environmental Protection Agency - Region 5
77 W. Jackson Blvd. SR-6
Chicago, IL 60604

Subject: Plainwell Mill RI/FS Phase I Work Plan Groundwater Investigation/Coal Tunnel Assessment
Operable Unit No. 7 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Plainwell, Michigan

Dear Sam:

On behalf of Weyerhaeuser Company (Weyerhaeuser), RMT, Inc. (RMT), is submitting for your review this Work Plan for initial groundwater investigation and coal tunnel assessment activities. This Work Plan is Phase I of the September 2006 draft Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the Plainwell Mill site, located at 200 Allegan Street, in Plainwell, Michigan. The phased approach was approved by the United States Environmental Protection Agency in a letter dated August 6, 2008.

We would be glad to discuss any changes or additions you may have as part of the review process. Please let us know if you would like this version submitted to anyone else at this time. Please contact me at (262) 879-1212 if you have any questions. Thank you in advance for your assistance.

Sincerely,

RMT, Inc.

James L. Hutchens
Sr. Project Manager

cmk/enclosure

cc: Paul Bucholtz, Michigan Department of Environmental Quality
Jennifer Hale, Weyerhaeuser Company
Richard Gay, Weyerhaeuser Company
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Initial Groundwater and Coal Tunnel Assessment

Plainwell Mill
Plainwell, Michigan

Operable Unit No. 7 of the Allied Paper, Inc./
Portage Creek/Kalamazoo River Superfund Site

October 2008

RMT, Inc. | Weyerhaeuser Company
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Section 1 Introduction

On behalf of Weyerhaeuser Company (Weyerhaeuser), RMT, Inc. (RMT), is submitting this Work Plan for Phase I of the Remedial Investigation/Feasibility Study (RI/FS) for the Plainwell, Inc., Mill (the Plainwell Mill) site, located at 200 Allegan Street, in Plainwell, Michigan (Figure 1-1). The Plainwell Mill site is an approximately 35-acre property, which is designated as Operable Unit No. 7 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (Figure 1-2). On February 22, 2005, Weyerhaeuser entered into a Consent Decree with the United States Environmental Protection Agency (U.S. EPA), for the Design and Implementation of Certain Response Actions at Operable Unit No. 4 (the 12th Street Landfill site) and the Plainwell Mill site. A Statement of Work (SOW) for the RI/FS at the Plainwell Mill site was subsequently issued by the U.S. EPA, with an effective date of August 17, 2006 (Appendix A). In a letter dated August 6, 2008, from Sam Chummar, U.S. EPA remedial project manager, to Jennifer Hale, Weyerhaeuser Project Manager, the U.S. EPA approved the concept of a phased investigation approach for the Plainwell Mill operable unit. Thus, this Phase I RI/FS Work Plan presents an initial approach to investigating conditions in the local groundwater to be compared to groundwater standards and to help identify areas that require further investigation of soil conditions during the next phase of work.

As discussed with the U.S. EPA, this Phase I RI/FS Work Plan is part of a multi-volume Work Plan for the Plainwell Mill Site. The entire Plainwell Mill RI/FS Work Plan will include three separate parts:

- Overall Plainwell Mill RI/FS Work Plan that provides a summary of the available data through the 2006 Phase II Environmental Site Assessment, a discussion of the City's vision for the property, a multi-media Conceptual Site Model, and a synopsis of the objectives of the phased site investigation activities.
- This Phase I Groundwater and Coal Tunnel Assessment Work Plan that is intended to provide information regarding the potential for contaminant migration from on-site soils into the groundwater and assesses the possible movement or releases of oily material observed in the out-of-service coal tunnel present on site.
- Phase II Soil and Supplemental Groundwater Work Plan targeted for submittal to the U.S. EPA in late Spring 2009. The additional investigation activities to be included in the Phase II Work Plan will be based upon overall site soil investigation activities and will include any additional investigation resulting from results of the approved Test Pit Investigation and the Phase I Groundwater Investigation described in this Phase I Work Plan.

The limited existing groundwater data, generally permeable subsurface sands present along the Kalamazoo River, site history, and size and configuration of the Plainwell Mill property make a phased groundwater investigation especially useful for focusing data collection needed to meet the overall objectives of the RI/FS. This Phase I Work Plan provides the rationale and details for the initial groundwater evaluation at the Plainwell Mill. The Phase I Work Plan has also been expanded to determine if the presence of oily free product in the former 'Coal Conveyance' tunnel is causing a release to the environment. The results of this phase of the remedial investigation will be used to focus future soil and groundwater data collection activities and to confirm groundwater results from previous environmental assessments conducted on the site.

1.1 Overall RI/FS Objectives

As provided in the SOW, the objectives for the RI/FS for the Plainwell Mill site are as follows:

- **To determine the nature and extent of the contamination to assess risk and support development and evaluation of remedial alternatives** - Collect the data necessary to adequately characterize the nature and extent of contamination at the Mill, consistent with the requirements of the National Oil and Hazardous Substance Pollution Contingency Plan (March 8, 1990) ("NCP") and the Consent Decree.
- **To evaluate potential risk** - Assess any current and potential risks to human health or the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants at or from the Mill.
- **To develop and evaluate remedial alternatives** - Develop and evaluate alternatives, consistent with reasonably anticipated future land use(s) at the Mill, for remedial action to prevent, mitigate, control, or eliminate risks posed by any release or threatened release of historic contaminants present at or from the Mill.

The specific objectives of this Phase I Groundwater Evaluation are:

Groundwater Investigation Activities

- To define shallow groundwater quality across the Plainwell Mill site.
- To determine if free product is present on the groundwater table at the monitoring well locations.
- To assess shallow, site-specific hydrogeologic characteristics and interconnections with the Kalamazoo River that will be used to refine the preliminary Conceptual Site Model.

Coal Conveyance Tunnel

- To determine if there is an on-going release of oily material in the coal conveyance tunnel to the adjacent soil/groundwater.

- To refine the location and condition of the tunnel and possible access and egress points for future evaluations.

Other desired outcomes from this Phase I Site Investigation are to assess whether past site data are consistent with current results and can be utilized to provide perspective during data interpretation activities and to identify data gaps that need to be addressed during Phase II investigations of soil and groundwater.

1.2 Scope of the RI/FS Work Plan

This Phase I RI/FS Work Plan has been developed to meet the applicable requirements of the SOW. Additional data interpretation that will incorporate the results of this groundwater investigation and the results from the Mill Banks Addendum Test Pit Activities, the Mill Banks Emergency Action and the overall site soil investigation will be integrated into a Phase II RI/FS Work Plan. As mentioned previously, the Phase II Work Plan will be prepared and submitted to the U.S. EPA in Spring 2009.

The specific sections of the Phase I RI/FS Work Plan include:

- **Background (Section 2)** - This section summarizes the pertinent information from the RI/FS Work Plan as it relates to this phase of the investigation.
- **Data gaps and principal study questions (Section 3)** - This section identifies data gaps related to the groundwater condition at the site based on the preliminary conceptual model for current conditions and historical land use and reasonably anticipated future land uses.
- **Approach to the Phase I investigation (Section 4)** - This section presents the overall approach for the Phase I Groundwater Investigation and Coal Tunnel Assessment, which is focused on addressing the principal study questions through visual observations as well as chemical and physical data collection activities. This section provides the specific sample locations, media, and analytes, and also discusses the rationale for the scope of the data collection activities.
- **Project schedule (Sections 5)** - This sections provide schedules for completing the Phase I Groundwater Investigation.

Section 2
Background

In accordance with the SOW for the RI/FS, the overall RI/FS Work Plan will include a more detailed summary of historical information currently available for the Plainwell Mill site, including historical ownership and operations, wastewater treatment, the use of hazardous substances at the site, past waste disposal practices, and the scope and results of previous environmental sampling and remedial activities. This section provides a brief summary of historical mill operations, treatment facilities, hazardous substances, and an overview of past environmental activities at the site to provide a context for this Phase 1 Groundwater Work Plan.

2.1 Historical Mill Operations

Site historical operations have been summarized in the description of the current situation prepared by BBL (1992) as part of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site and in four Phase I Environmental Site Assessments of the Plainwell Mill property over the last 12 years (RMT, 1996; ERM, 1997; F&V, 2001; and FTC&H, 2003).

Plainwell Mill property was the site of paper-making operations for over 100 years, from at least 1884 through 2000 when the owner filed for bankruptcy. During the period of operation of the mill, there were many owners and operators (see Text-Box 2-1). Weyerhaeuser owned and operated the mill for approximately a 9-year period between 1961 and 1970. The City of Plainwell purchased the property out of bankruptcy on August 31, 2006.

Text-Box 2-1
History of Property Ownership (approximate dates)

- (at least) 1884 – Lyon Paper Mill
- 1891 to 1956 – Michigan Paper Company
- 1956 to 1961 – Hamilton Paper Company
- 1961 to 1970 – Weyerhaeuser Company
- 1970 to 1985 – Phillip Morris (operated the Nicolet Paper Company)
- 1985 to 1987 – Chesapeake Corporation
- 1987 to 2000 – Simpson Plainwell Paper Company
- 2006 – City of Plainwell

The primary paper-making operations took place in the northeastern portion of the site adjacent to the Kalamazoo River and the existing mill race, while much of the remainder of the property provided a buffer zone from nearby residences, on-site parking for employees, and space for future (and unrealized) expansion. The actual acreage of the Mill property was expanded over time, based on aerial photographs, Sanborn maps and descriptive documents, with undeveloped properties west of Michigan Avenue being purchased as recently as the 1990s (Figure 2-1). In addition, the former mill complex, which is actually composed of several adjacent and conjoined structures, has been expanded over time (RMT, 1996).

For the Kalamazoo area, the Plainwell Mill was a small facility, with a capacity in 1996 of 300 tons of finished product per day (RMT, 1996). The available information indicates that the mill produced coated and uncoated book and cover, "release base," and technical specialty paper products. By 1996, water for mill property operations was supplied by seven groundwater wells, including four process wells, two fire water supply wells, and one well for nonsanitary purposes at the mill treatment plant (RMT, 1996); the process wells were used to pump a total of approximately 2.8 million gallons of groundwater per day (MGD) for use in paper-making operations. In the northwestern portion of the site, wastewater sludge lagoons and eventually secondary treatment were added beginning in 1954 (see Table 2-1).

Table 2-1
Summary of Wastewater Treatment Processes

Time Frame	Treatment Approach
Before 1954	Direct Discharge
1954 to 1967	Primary Treatment with discharge. Sludge dewatered in lagoons and then landfilled at 12th Street Landfill.
1968 to 1981	Primary and Secondary Treatment using aeration then discharge. Sludge dewatered in lagoons and then landfilled at 12th Street Landfill. Some biosolids from Aeration Basin also landfilled.
Post 1981	Primary Treatment and activated sludge secondary treatment then discharge. Sludge mechanically dewatered on site and sent to Cork Street Landfill in Kalamazoo.

Source of Information: Current Conditions Summary, BBL(1992)

2.2 Hazardous Substances

Currently available information indicates that during paper-making operations at this site, several materials containing CERCLA-regulated hazardous substances were used. If these substances were released to the environment, then the nature and extent of the substances will need to be defined as part of the RI/FS process. Hazardous substance–containing materials potentially used or generated at the site include the following:

- **Coal and fly ash** - The historical aerial photographs for this site appear to show that the north central portion of this site was used to store piles of coal beginning in the 1960s. In addition, fly ash that was generated from the burning of coal was mixed with wastewater sludge, before the sludge was taken off-site for disposal (RMT, 1996). Coal may contain metals and polycyclic aromatic hydrocarbons (PAHs), depending on its origin; organic compounds are generally at or below detection limits in fly ash (U.S. EPA, 1999), but metals may be present.

- **Paper-making additives, parts cleaning products, and petroleum products** - Certain paper-making additives, as well as small quantities of parts-cleaning solvents, containing volatile organic compounds (VOCs) and/or PAHs, appear to have been used at the site. In addition, tanks containing petroleum products (*i.e.,* No. 6 fuel oil, gasoline, diesel, and kerosene) were present on the property, although hazardous substances associated with these tanks and piping are likely subject to the petroleum exclusion (CERCLA Section 101[14].

- **Electrical equipment fluids and hydraulic lubricants** – Prior to the 1970s, some fluids used in electrical equipment, such as transformers and capacitors, as well as hydraulic fluids, commonly contained polychlorinated biphenyl (PCBs). In the 1980s and 1990s, the Simpson Plainwell Paper Company inventoried and sampled fluids and equipment that were present at the site and removed those that were found to contain PCBs. Between 1984 and 1995, no releases or spills to the environment of PCB-containing liquids are known to have occurred from operations inside the mill buildings (RMT, 1996).

Waste materials generated by the mill, which could potentially have contained CERCLA-regulated hazardous substances, included waste oil, spent solvents (prior to 1994), and wastewater sludge (RMT, 1996).

- **Used oil** - Used oil, generated from the maintenance of the paper machines, was stored in 55-gallon drums inside the mill and was subsequently hauled and disposed off site since at least 1956 by a local oil recycler.
- **Spent solvents** - Prior to 1994, solvents were used at the mill for parts cleaning. The spent solvents were manifested and disposed off site as a hazardous waste. In 1994, the mill switched to a nonhazardous citrus-based parts cleaner solvent.
- **Wastewater sludge** - In the late 1950s and early 1960s, a portion of the waste paper that was deinked and recycled at the mill may have included PCB–containing carbonless copy paper. Wastewater sludge generated during this time period could contain measurable concentrations of PCBs. After deinking was discontinued at the mill in 1963, the likelihood of significant concentrations of PCBs being present in the wastewater sludge substantially decreased. The likelihood of substantial concentrations of PCBs in wastewater sludge decreased further after 1971 when manufacture of PCB-containing carbonless copy paper ceased in the United States.

2.3 Previous Site Investigations and Remedial Actions

Previous investigations at the site have been performed in three areas of the Plainwell Mill site: 1) the former wastewater sludge dewatering lagoon and aeration basin area; 2) the northcentral portion of the site, including the former coal pile storage area and the vicinity of the No. 6 fuel oil tank; and 3) the mill buildings area. Remedial actions and confirmation sampling were also performed in response to a spill near the No. 6 fuel oil tank, in response to elevated PCB concentrations found in a storm sewer and a former wastewater discharge pipe located on the northern side of the mill buildings, and during an Emergency Action to remove paper residuals from along the Mill Banks. One of the investigations was performed by Blasland, Bouck, and Lee (BBL, 1996a), as part of the U.S. EPA-approved Remedial Investigation for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. Other investigations were performed as due diligence for a prospective property transfer (ERM, 1997) or by consultants to the Simpson Plainwell Paper Company or previous and current owners (Wilkins & Wheaton, 1980; Taplin, 1999; FTC&H, 2006), with that information being provided to the Michigan Department of Environmental Quality (MDEQ) as part of the state's baseline environmental assessment process.

2.3.1 Former Wastewater Sludge Dewatering Lagoon and Aeration Basin Area

Three investigations have been performed in this area, including soil sampling as part of the U.S. EPA-approved remedial investigation for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (BBL, 1996a) and soil and groundwater sampling as part of Phase II Environmental Site Assessments performed by ERM in 1997 and by FTC&H in 2006. The primary objective of the BBL investigation was to assess whether the Plainwell Mill may have been a potential source of PCBs to the Kalamazoo River (BBL, 1996a). To achieve this objective, Geoprobe® borings were advanced in 11 of the 14 former wastewater sludge dewatering lagoons and in the former aeration basin (Figure 2-1). For the investigation by ERM in 1997, the primary objectives were to determine the concentrations of metals in soil and to determine if the materials present in the lagoons had adversely affected groundwater (ERM, 1997). Shallow groundwater samples were collected as part of the study from temporary wells at two locations, along with soil samples from Lagoons I, J, M, and N (Figure 2-1). In 2006, FTC&H advanced four borings and installed one shallow temporary groundwater monitoring well to evaluate identified recognized environmental conditions (RECs) in this area.

2.3.2 Northcentral Portion of the Site

Three investigations have been performed in this area of the site, including a geotechnical investigation performed in 1980 (Wilkins & Wheaton, 1980), a Phase II Environmental Site Assessment performed in 1996 (ERM, 1997), and a soil investigation performed subsequent to a fuel oil spill cleanup in 1999 (Plainwell Paper, 1999; Plainwell Paper, 2000). The objective of the investigation performed by Wilkins & Wheaton in 1980 was to visually characterize the soil located in the vicinity of a then-proposed building addition. The scope of the investigation included installing 20 soil borings. For the assessment performed by ERM in 1996, the objective was to determine if there were constituents of potential concern in three areas in the northcentral portion of the site: 1) the 200,000-gallon fuel oil aboveground storage tank (AST) area, 2) the former coal pile storage area, and 3) the area located between the former coal pile storage area and the Kalamazoo River (ERM, 1997). The scope of the ERM investigation included the collection and analysis of soil and groundwater samples. Finally, the objective of the soil investigations performed by Taplin Environmental Services, Inc. and Plainwell Paper

Company was to collect confirmatory samples in an area adjacent to the No. 6 fuel oil containment structure, following a fuel oil spill in 1999. As part of the cleanup of the spill, Taplin removed free liquids, contaminated soil, and absorbents from the area (Taplin, 1999). The scope of the post-excavation soil sampling included the collection of samples for the analysis of petroleum-related volatile organic compounds (PVOCs), and PAHs (Plainwell Paper, 1999).

2.3.3 Mill Buildings Area

Four investigations have been performed in this area of the site, including sampling and analysis of soil in areas near former wastewater treatment operations and of sediment contained in a storm sewer and a former wastewater discharge pipe in 1994 (BBL, 1996a), sampling and analysis of soil and groundwater as part of a Phase II Environmental Site Assessment performed in 1996 (ERM, 1997) and 2006 (FTC&H, 2006), and sampling of soil on the Plainwell Mill site for PCB analysis, as part of a larger investigation that focused on bank soil in the Kalamazoo River (CDM, 2001). Remediation of PCB-containing sediment in the storm sewer and former wastewater discharge pipe was also performed (BBL, 1996b; BBL, 1998). The primary objectives of the BBL investigation were to determine if soil in the area of the former primary clarifier, a possible wastewater sludge storage area, and a potential warehouse construction area or sediment in a storm sewer and in a former wastewater discharge pipe contained elevated levels of PCBs. The sample collected from inside the storm sewer manhole was also analyzed for dioxin congeners (BBL, 1996a). For the assessment performed by ERM in 1996, the objectives were to determine if there were constituents of potential concern in the soil in the vicinity of the former 300-gallon gasoline UST, or in the groundwater downgradient of the former gasoline UST, kerosene UST, or diesel AST, which were formerly located along the northern side of the mill buildings. The assessment performed by FTC&H in 2006 included groundwater sampling near the No. 6 fuel oil AST and downgradient of the AST/UST area near the mill buildings.

Section 3
Possible Data Gaps

3.1 Evaluation of Current Conditions and Data Gaps: Groundwater

On the basis of a thorough review and evaluation of the available information on historical uses of the Mill property and of the existing data, Weyerhaeuser has identified possible data gaps associated with both the limited amount and types of previous groundwater data available on the Plainwell Mill site. As discussed in Section 2, historic activities on the property support the assessing the mill conditions by focusing on four separate sub-areas for investigation: 1) former wastewater sludge dewatering lagoon and aeration basin area, 2) north central portion of the site, 3) Mill buildings area, and 4) undeveloped/historic residential areas of the site. Figure 3-1 depicts the previous monitoring points. Groundwater analytical results are presented on the figure and summarized on Table 3-1.

Based upon past soil and groundwater data, the constituents of potential concern (COPCs) for the shallow groundwater have been defined as PCBs, eight metals, VOCs, and PAHs.

3.1.1 Former Wastewater Sludge Dewatering Lagoon and Aeration Basin Area

Three groundwater samples were collected; two in 1997 and one in 2006. The samples from 1997 were analyzed for VOCs, PAHs, and eight dissolved metals. The 2006 samples were analyzed for PCBs and eight metals. Under current MDEQ guidelines, the metals sampling procedures used in the 1997 sampling event were not appropriate for comparison to potentially applicable criteria since the groundwater samples were filtered and then analyzed for the dissolved metals fraction. The use of temporary wells also raises concern about the representativeness of the samples; wells are not sealed and are difficult to effectively develop and purge. Dissolved chromium was detected in 1997, and arsenic was above the Part 201 criteria in 2006. Based on the above information, concentrations of COPCs (*i.e.*, metals, PCBs, VOCs, and PAHs) in groundwater both upgradient and downgradient of this area represent a possible data gap.

3.1.2 Northcentral Portion of the Site

Ten groundwater samples were collected from this sub-area with seven samples obtained in 1997 and three in 2006. The groundwater samples from 1997 were collected from temporary wells and analyzed for VOCs, PAHs, and eight dissolved metals. The metals sampling procedures used in the 1997 sampling event were not appropriate for comparison to potentially applicable criteria (*i.e.*, the groundwater samples were filtered and analyzed for the dissolved metals fraction). The samples from 2006 were analyzed for PNAs, phenols, and eight metals. The 2006 wells were installed with 5-foot screens ranging from 8 to 15 feet below ground surface (bgs) in this area. VOCs were not detected and all PAH detections were below quantitation limits. Chromium and mercury were detected, but only mercury was above the compared criteria at a single location.

A reported spill occurred in 1999 adjacent to the No. 6 fuel oil tank. The spill originated from leaking pipes inside the pump house, affecting the area inside the pump house and an area approximately 20 feet by 20 feet immediately to the east. Remediation consisted of removal of free liquids, contaminated soil, and absorbents from the affected indoor and outdoor areas. An estimated 3,000 gallons of liquids and 19 cubic yards of impacted soil were removed (Taplin, 1999). No groundwater samples have been collected since the spill occurred. Therefore, concentrations of COPCs (*i.e.*, metals, PCBs, VOCs, and PAHs) in groundwater located upgradient and downgradient of this area represent a possible data gap.

3.1.3 Mill Buildings Area

Nine groundwater samples were collected in this area: seven in 1997 and two in 2006. The groundwater samples were taken from temporary wells. All of the samples were analyzed for VOCs, PAHs, and eight dissolved metals. VOCs were not detected in seven of the nine wells; PAHs were not detected in six of nine wells and below criteria at the remaining locations. Metals above possible criteria in at least one location were cadmium, copper, lead, mercury, and zinc. Therefore, a more detailed characterization of the groundwater located upgradient and downgradient of former mill buildings represents a possible data gap.

3.1.4 Undeveloped Areas

Since no historical groundwater data are available in the undeveloped areas of the site, including parking lots and wooded areas, the U.S. EPA has requested that these areas be considered in the investigation activities.

3.2 Principal Groundwater Study Questions

A preliminary conceptual site model for the Plainwell Mill site was described in Section 3 of the draft overall RI/FS Work Plan. This preliminary Conceptual Site Model was developed from information and data related to historical mill operations, as well as previous Phase I and Phase II Environmental Site Assessments, and other data gathered during various investigations and remedial actions. The preliminary Conceptual Site Model also considers the physical setting of the site, including site location, site topography and drainage, site geology, and groundwater occurrence and flow. Finally, the model summarizes the location and character of potential sources of CERCLA-regulated hazardous substances (*i.e.*, areas of potential environmental concern), and the COPCs and potential migration and exposure pathways for COPCs in those areas.

This preliminary conceptual site model has been used to identify principal study questions for the RI/FS at the Plainwell Mill site. These principal study questions are part of the larger Data Quality Objective (DQO) process and are presented in detail as part of the approved multi-area Quality Assurance Project Plan (QAPP). The DQO process consists of a series of planning steps based on a scientific method that is designed to ensure that the type, quality, and volume of environmental data used in decision-making are appropriate for the intended application. The following principal study questions relating to the shallow groundwater at the site include:

1. What are the hydrologic characteristics (depth, flow direction, hydraulic gradient) of the groundwater at the site?
2. What is the interrelationship of the groundwater and river flow system?
3. What are the saturated soils physical characteristics?
4. Does groundwater at the site pose a potential unacceptable risk under current and reasonably anticipated future land uses?

3.3 Evaluation of Current Conditions and Data Gaps: Coal Conveyance Tunnel

The U.S. EPA contacted Weyerhaeuser on August 1, 2008, with a concern regarding a letter in their possession from a Mr. David Seiler to Attorney Pam Barker dated June 18, 2003, describing the following;

> "Lastly, as you already know, there is an unknown quantity of No. 6 fuel oil in the old coal conveyor tunnel. This has been there forever and is virtually impossible to remove until removal of the coal conveyor itself. And, of course, there is a small amount of No. 6 fuel oil in the underground piping from the oil tank to the power plant."

Based on the U.S. EPA concerns, Weyerhaeuser performed a site visit on August 11 and 12, 2008, to review the conditions of the coal tunnel. The tunnel entry area is accessible near the Mill buildings without requiring confined space training. This end of the conveyance tunnel was visually assessed and photographs taken to better understand how material may have entered the tunnel. In addition, historical drawings were reviewed to determine the construction details of the conveyance tunnel. This information has been synthesized into a preliminary Conceptual Site Model to help identify possible issues associated with the material in the tunnel.

3.3.1 Petroleum Products

Petroleum products are documented to have been present on the Plainwell Mill property in the draft Plainwell Mill RI/FS Work Plan. Petroleum products were used at the Plainwell Mill as fuels and lubricants when the facility was operating. In the vicinity of the Mill buildings, the only reported release was from the 200,000-gallon above ground tank (AST) containing No. 6 fuel oil. The location of the No. 6 fuel release occurred approximately 200 to 300 feet from the conveyance tunnel. The physical characteristics of No. 6 fuel inhibit the potential for this spill to cause an impact at the distance to the coal tunnel locations due to the elevated pour point of No. 6 fuel oil. The pour point for No. 6 fuel oil is between 43 and 59°F, making it highly viscous at ambient temperatures and usually requires heating to temperatures of at least 100°F for the material to be pumped.

3.3.2 Historical Construction Drawings

A review of historical construction drawings could not determine when the coal tunnel was originally constructed. The original tunnel extended approximately 40 feet from the main boiler room wall to the southwest. Penetrations through the tunnel included two steel conduits, one of which contained a natural gas line and another that contained fuel oil supply and return lines as well as steam and condensate lines from the No. 6 Fuel oil tank to the boiler room. An additional 80 feet of tunnel was constructed in the mid-1970s. At that time, it appears that the conveyor system was installed at a different angle which required re-routing of the two conduits. The steel conduits were cut at the wall of the tunnel and the piping routed underneath the conveyor using two 90° elbows. Both sections of tunnel appear to be constructed of 18 to 24 inches poured concrete walls, floor, and ceiling.

3.3.3 Visual Assessment

The northeast end of the coal tunnel, closest to the Mill building, was accessible through a single doorway at ground surface. In addition, some of the roof and walls of the overhead structure at this end of the conveyance tunnel are no longer in place. A visual assessment was performed for approximately 20 feet of the tunnel nearest the boiler room. Due to unknown conditions further into the tunnel and the requirement for confined space access procedures, only the safely accessed older section was physically entered at this time. The newer end of the tunnel was observed from the older section by using hand held spotlights.

The older section of tunnel had some minimal cracking on the concrete walls. The observable portion of the newer tunnel appeared to be in good condition with no visible cracks identified. The newer tunnel was viewed from a vantage point within the original tunnel area.

During the site visit, approximately 1 foot of mixed liquid/solid material was observed within the bottom of the coal conveyance tunnel. Based on this visual assessment, it appeared that the surficial 6 inches of the material is water and the remaining 6 inches is a mixture of coal fines, water, and a petroleum-based product such as some grade of fuel oil.

There is some staining visible along the wall of the tunnel beneath the existing conduits that contain the fuel oil lines outside of the coal tunnel. Based on visually looking into the conduit, there appears to be an end cap placed on it. In addition, it appears that the conduit toward the Mill building may terminate approximately 2 feet beyond the coal tunnel wall. The conveyor system is still in place within the tunnel itself severely limiting access.

Based on the above information, data gaps include the type of material within the coal tunnel and whether that material may have migrated out of the tunnel.

Section 4
Phase 1 Site Investigation

4.1 Initial Groundwater Investigation

Based on the identified data gaps and historical site use and to meet the objectives developed in Section 1 and repeated in Text Box 4-1, Weyerhaeuser proposes to install a total of twelve water table monitoring wells and three staff gages. The approximate locations of these wells are shown on Figure 4-1. A discussion of the rationale supporting each specific location follows and is also summarized on Table 4-1. All monitoring wells will be installed as water table wells throughout this Phase I groundwater investigation to best evaluate the potential presence of free petroleum product on the water table. Results from this water table evaluation will also provide critical information on the interconnection of the groundwater system and the river to establish locations for groundwater surface water interface wells and identify possible impacts of surface water quality on the analytical results. The groundwater analytical data will be used to select shallow groundwater COPCs and provide information to determine the best locations for deeper monitoring wells and the specific parameters that will need to be evaluated with depth. Details on the follow-up groundwater investigation will be presented in the Phase II Work Plan.

Text Box 4-1
Groundwater Work Plan Objectives

- To define shallow groundwater quality across the Plainwell Mill site.
- To determine if free product is present on the groundwater table at the monitoring well locations.
- To assess shallow site specific hydro-geologic characteristics and interconnections with the Kalamazoo River that will be used to refine the current Conceptual Site Model.

4.1.1 Monitoring Well Locations

Mill Buildings Area

Since this area has the greatest uncertainty and the highest potential for source areas that could impact groundwater, one upgradient and four downgradient groundwater monitoring wells and two river staff gages are proposed to be installed. Each well is located immediately downgradient of potential sources of free project or contaminants. The two staff gages provide information regarding water elevation in the river that can be compared to groundwater elevations to assess whether the groundwater is discharging to the river from the Mill property or if surface water from the river could be mixed with the groundwater near the monitoring wells. The staff gage in the Mill Race may also provide information on the implications of that manmade channel on the local groundwater and surface water flow systems.

Monitoring Wells

- Background Monitoring Well - Upgradient of the former Mill building complex
- Downgradient of coal conveyance tunnel
- Downgradient/Source Assessment Wells
  - Downgradient of the former transformer pad near the area of the observed oil sheen during emergency bank excavation activities
  - Downgradient of Mill buildings near former drum storage area
  - Downgradient of fuel oil AST and buildings, near several outfalls

Staff Gages

- Adjacent to Allegan Street, in the Mill race
- Kalamazoo River adjacent to former drum storage area

Northcentral Portion of the Site

The primary concerns in this area are associated with the coal pile and the impact of the coal and historic fill material on soil chemistry. This issue will be evaluated in more detail during the Phase II activities. However, groundwater sampling is proposed in two locations to assess possible groundwater impacts from these areas. The two groundwater monitoring wells will be placed as follows:

- Downgradient of coal pile area and former Specialty Minerals Building
- Near elevated PCB levels identified during emergency action (Zone C) which is also downgradient of coal piles and Specialty Minerals

Former Wastewater Sludge Dewatering Lagoons and Aeration Basin Area

Past groundwater and soil investigation activities have confirmed the historical record that most of the wastewater solids present in the lagoons were removed from the site before the Mill was closed. The historical records do indicate that some non-natural fill remains in certain lagoons and the former aeration basin. Observations made during the Emergency Bank removal confirm that there was primarily demolition debris present in the former aeration basin. As with the remainder of the Mill site, there is limited groundwater data available; therefore, three groundwater monitoring wells and one staff gage will be installed near the lagoons to help understand sources, hydrogeology, river interfaces, and local groundwater quality. All three proposed monitoring wells have been placed where the fill is expected to be present in the lagoons or where the historical record is incomplete. The downstream staff gage will be located to refine the surface water/groundwater relationships along this part of the shoreline.

Monitoring Wells

- Downgradient of former aeration basin
- Downgradient of former lagoons K and C
- Downgradient of former lagoons H, I, J, L, M, and N

Staff Gage

- Kalamazoo River adjacent to former lagoon area

Undeveloped Areas

There are no indications of possible contaminant sources to the groundwater in these areas so the monitoring wells are likely to provide upgradient groundwater quality information. However, if the groundwater results suggest a possible impact, additional upgradient wells will be proposed in the Phase II Work Plan.

- Upgradient of the north central area, downgradient of city neighborhood
- Upgradient of the former wastewater treatment plant, downgradient of former off site commercial properties (dry cleaner, gas station)

4.1.2 Hydrogeological and Groundwater Quality Assessment Information

Following installation of the wells, an as-built plan map will be prepared specifying the vertical and horizontal location of the wells. The following information will be collected from the monitoring well network:

1. *Hydrogeologic Information* – The following information will be collected from the monitoring wells to assess both site-wide and area-specific groundwater conditions:
   - Determined shallow groundwater elevation: Measure water levels in the monitoring wells and staff gages in the time period leading up to, and

during, the collection of groundwater samples, to assess groundwater flow direction and gradient, to confirm that groundwater is flowing toward the river, and to confirm that water samples collected from the monitoring wells are representative of groundwater.

- Estimate hydraulic conductivity: Conduct single well response tests (slug tests) to measure the hydraulic conductivity of the shallow sand and gravel aquifer, and analyze the test data using the method of Bouwer and Rice (1976).
- Define shallow soil types: Classify soil at the groundwater monitoring well locations to assess general site conditions. For select samples of aquifer materials, confirm soil classifications and hydraulic conductivity using sieve analysis to develop grain-size distribution curves and to estimate hydraulic conductivity using the method of Masch and Denny (1966).

2. *Analytes* - Collect groundwater samples, using low-flow sampling methods, from each of the twelve water table monitoring wells, and analyze all groundwater samples for COPCs (specifically, metals, PCBs, PAHs, and VOCs, as well as total suspended solids [TSS]). Use low-level sampling and analytical methods for mercury.

4.2 Coal Tunnel Investigation

The Coal Tunnel Investigation Plan was developed based upon the information summarized in Section 3.3. The objectives of this investigation and sampling plan are presented in Text Box 4-2. If a release is confirmed, then a supplemental sampling plan will be prepared to further evaluate the nature and extent of any release to the degree required under the Superfund process.

Text-Box 4-2
Coal Tunnel Investigation Objectives

- To determine if there is an on-going release of oily material in the coal conveyance tunnel to the adjacent soil/groundwater.
- To define the location and condition of the tunnel and possible access and egress points for future evaluations.

Proposed Sampling Locations and Analytical Program

Due to the location of the tunnel in relation to the existing buildings, depth of tunnel, and materials observed within tunnel, a combination of further assessments of the tunnel and groundwater have been selected as the best method for meeting the objective defined previously. The investigation activities consists of the following:

1. **Determine if oily material is present in nearby groundwater:** Install a monitoring well (as described above) in the assumed downgradient direction of the tunnel toward the Kalamazoo River to determine if the material had migrated out of the tunnel. If oil is observed within this well, additional wells will be proposed for the next phase of investigation.

2. **Understand the physical conditions of the tunnel:**
   - Examine the fuel lines and conduit outside of the tunnel by hand excavating outside of the tunnel down to the piping to determine the length of conduit and condition of the piping and surrounding soils. This approach provides information on the competence of the lines and conduit immediately adjacent to the tunnel wall to help establish the condition of the pipe conduit containing the fuel oil lines closest to the mill buildings and identify other lines that may be present.
   - Physically assess the interior of the tunnel including clearing the ground surface on top of the tunnel to determine if additional access points are available. In addition, clearing the ground surface will assist in refining the extent and location of subsurface coal tunnel. Once any additional access points are uncovered, the interior of the tunnel will be assessed. Using proper safety equipment, the entire interior length of tunnel will be visually assessed for pipe penetrations, cracking, or potential breaches of the tunnel. A sample of the material within the tunnel will be sampled and analyzed for PCBs, PAHs, and eight metals.

4.3 Soil Boring Methods

The monitoring wells will be installed as follows. A boring will be installed with 6.25-inch inner-diameter augers for collection of soil samples. Split-spoon sampling will be performed at continuous intervals through the hollow-stemmed augers as the borings are advanced, in general accordance with ASTM Method 1586. Split-spoon samplers will be driven using a 140-pound hammer with a 30-inch drop. Unless necessary to control heaving of sand within the augers, drilling fluids will not be used.

4.4 Monitoring Well Construction

The monitoring wells have been designed to provide representative groundwater samples from the aquifer. PVC was selected as the material of choice for construction of the monitoring wells because it has been shown to be non-reactive with inorganic compounds, including metals, as well as organic compounds. The monitoring wells will be constructed as follows. The wells will be built using 2-inch diameter Schedule 40 PVC riser and 0.010 screen. A No. 20-40 mesh sand pack will be used in accordance with ASTM Method D-5092-90.

The wells will be constructed with a 10-foot screen, which will be placed to straddle the water table. Artificial sand packs will be installed from the base of the well screen to 1 foot above the top of the well screen, unless space prohibits. Above the top of the screen, the well will be constructed with solid PVC risers. A bentonite seal will extend from 0.5 to 1 foot above the top of the well screen to 2 feet below the ground surface, and concrete will extend from 2 feet below grade to the ground surface, where feasible. At a minimum, 2 feet of bentonite seal will be placed above the top of the screen. The deep monitoring wells will be constructed with the sand pack extending 1 foot above the top of the screen and with a minimum 2-foot bentonite seal. The annulus will then be grouted from the bottom to the surface with a cement-bentonite grout. Each monitoring well will be furnished with watertight expansion plugs. The wells will be finished with a locking protective surface casing and will extend 2 to 3 feet above final grade.

4.5 Well Development

The wells will be developed to ensure that the wells have a good hydraulic connection with the shallow aquifer. The wells will be developed by surging and purging with a surge block and submersible pump system. Well development will be performed until the water discharged from the wells is free of sediment, if possible. The turbidity of the water from well development will be monitored using a nephelometer. If the turbidity of the water is not decreasing at an appreciable rate after 4 hours, then well development may be ceased at that time. If the well screen becomes clogged and surging and pumping are not effective for well development, water jetting, along with surging and purging, may be performed to remove the fines from the well screen. If water is injected into the wells during well development, water from a municipal water supply will be used, and the volume injected will be documented, along with the purge volumes that are removed during well development. Well development procedures involving the introduction of water will be performed in consultation with the U.S. EPA.

4.6 Equipment Decontamination and Disposal of Investigation-derived Waste

Equipment will be decontaminated and investigation-derived waste will be disposed in accordance with Section 6 of the Multi-Area Field Sampling Plan (RMT, 2008b).

Section 5
Project Schedule

The schedule for completion of the groundwater investigation is presented below. The proposed schedule anticipates installation of wells and staff gages prior to potential snow accumulation.

- October 17 – Issue Phase I Work Plan to the U.S. EPA
- Week of November 14 – Receive comments from the U.S. EPA/MDEQ
- Week of November 17 – Response to comments sent to the U.S. EPA
- Week of December 1 – Prepare for groundwater well installation
- Week of December 8 – Start well installation (estimate 1.5 to 2 weeks for installation)
- Week of December 8 – Perform coal tunnel assessment
- Week of December 15 – Initial groundwater sampling and stage measurements
- Week of December 20 – Survey final well locations

Table 3-1
Previous Groundwater Monitoring Data
Plainwell Mill

Plainwell Mill Groundwater Data

Investigation		RANGE OF POTENTIALLY APPLICABLE PART 201 CRITERIA								ERM Phase II													FTC&H Phase II							
Sampling Location					SGWA-1	SGWA-2	SGWA-3	SGWA-4	SGWA-5	SGWB-1	SGWB-2	SGWB-3	SGWB-4	SGWB-10	SGWK-1	SGWB-5	SGWB-6	SGWB-7	SGWG-1	SGWB-9	SGWB-8	TW-8	TW-9	TW-7	TW-7 DUP	TW-5	TW-3	TW-3 DUP	TW-6	TW-6 DUP	TB
Collection Date					4/21/1997	4/21/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006
Volatile Organic Compounds	**CAS No.**	ug/L			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	67641	730.0	-	1.E+09	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<20	-	-	-	-	-	<20	<20	<20
Acrylonitrile	107131	2.6	-	1.9E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2.0	<2.0	-	-	-	-	-	<2.0	<2.0	<2.0
Benzene	71432	5.0	-	35,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Bromodichloromethane	75274	80.0	-	37,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Bromoform	75252	80.0	-	3.1E+06	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Bromobenzene	108861	18.0	-	3.9E+05	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Bromochloromethane	74975	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Bromomethane	74839	10.0	-	70,000.0	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0
n-Butylbenzene	104518	80.0	-	5,900.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
sec-Butylbenzene	135988	80.0	-	4,400.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
tert-Butylbenzene	98066	80.0	-	8,900.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
2-Butanone	78933	2,200.0	-	2.4E+08	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	-	-	-	-	-
Carbon Disulfide	75150	800.0	-	1.2E+06	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Carbon Tetrachloride	56235	5.0	-	4,600.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Chlorobenzene	108907	47.0	-	4.7E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Chlorodibromomethane	124481	80.0	-	1.1E+05	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	-	-	-	-	-	-	-
Chloroethane	75003	430.0	-	5.7E+06	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0
2-Chloroethyl vinyl ether	110758	Part 201 Not Applicable			-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	-	-	-	-	-
Chloroform	67663	80.0	-	1.8E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Chloromethane	74873	260.0	-	4.9E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0
2-Chlorotoluene	95498	150.0	-	3.7E+05	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	106434	Part 201 Not Applicable			<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	124481	80.0	-	1.1E+05	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	96128	2.00E-01	-	1,200.0	<1.0	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	106934	5.00E-02	-	15,000.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	95501	16.0	-	1.6E+05	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	541731	6.6	-	2,000.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	106467	13.0	-	74,000.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	75718	1,700.0	-	3.E+05	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	75343	740.0	-	2.4E+06	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,2-Dichloroethane	107062	5.0	-	59,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,1-Dichloroethene	75354	7.0	-	11,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
cis 1,2-Dichloroethene	156592	70.0	-	2.1E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
trans 1,2-Dichloroethene	156605	100.0	-	2.2E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,2-Dichloropropane	78875	5.0	-	36,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,3-Dichloropropane	142289	Part 201 Not Applicable			<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis 1,3-Dichloropropane	142289	Part 201 Not Applicable			-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
trans 1,3-Dichloropropane	142289	Part 201 Not Applicable			-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
2,2-Dichloropropane	594207	Part 201 Not Applicable			<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-Isopropyl-Ether	108203	30.0	-	8,000.0	<5.0	<5.0	<5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	100414	18.0	-	1.7E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Hexachlorobutadiene	87683	5.00E-02	-	3,200.0	<2.0	<2.0	<2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	591786	1,000.0	-	8.7E+06	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0
Isopropylbenzene	98828	800.0	-	56,000.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
p-Isopropyltoluene	99876	Part 201 Not Applicable			<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	75092	5.0	-	1.4E+06	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0
Methyl-tert-Butylether	1634044	40.0	-	4.7E+07	<5.0	<5.0	<5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	108101	1,800.0	-	2.E+07	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<5.0	<5.0	-	-	-	-	-	<5.0	<5.0	<5.0
Naphthalene	91203	13.0	-	31,000.0	<5.0	<5.0	<5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	103651	80.0	-	15,000.0	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	100425	80.0	-	3.1E+05	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	79345	3.2	-	77,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Tetrachloroethene	127184	5.0	-	1.7E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**0.38 J**	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Toluene	108883	140.0	-	5.3E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**0.29 J**	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,2,3-Trichlorobenzene	87616	Part 201 Not Applicable			<2.0	<2.0	<2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	120821	30.0	-	3.E+05	<2.0	<2.0	<2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	71556	200.0	-	1.3E+06	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	79005	5.0	-	1.1E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Trichloroethene	79016	5.0	-	97,000.0	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Trichlorofluoromethane	75694	2,600.0	-	1.1E+06	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	95636	17.0	-	56,000.0	<1.0	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	108678	45.0	-	61,000.0	<1.0	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Acetate	108054	640.0	-	8.9E+06	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	75014	2.0	-	13,000.0	<0.20	<0.20	<0.20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	-	-	-	-	-	<1.0	<1.0	<1.0
Total Xylene	1330207	35.0	-	1.9E+05	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**0.26 J**	**0.18 J**	-	-	-	-	-	<2.0	<2.0	<2.0

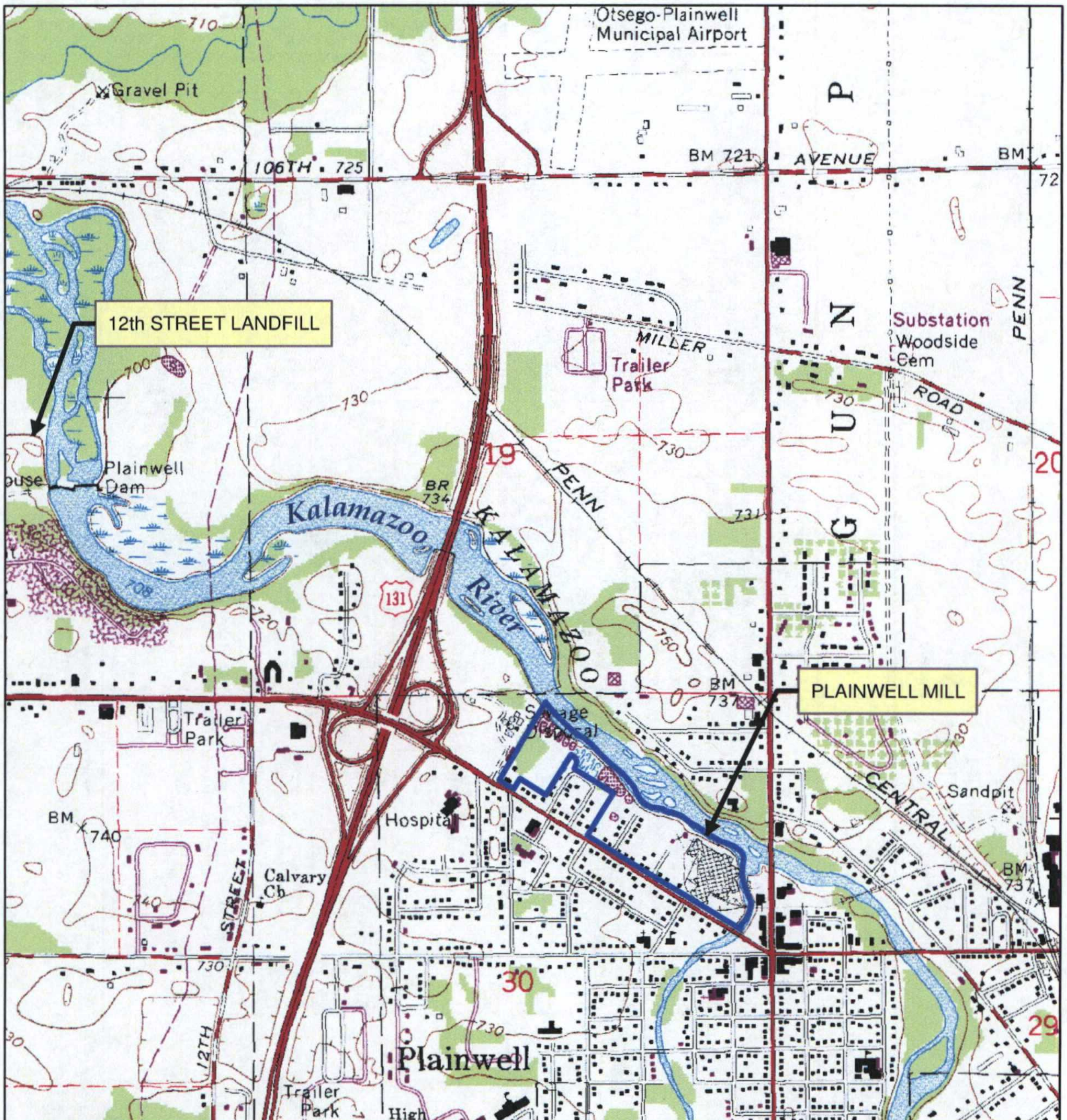
Table 3-1
Previous Groundwater Monitoring Data
Plainwell Mill

Plainwell Mill Groundwater Data

Investigation		RANGE OF POTENTIALLY APPLICABLE PART 201 CRITERIA								ERM Phase II												FTC&H Phase II									
Sampling Location					SGWA-1	SGWA-2	SGWA-3	SGWA-4	SGWA-5	SGWB-1	SGWB-2	SGWB-3	SGWB-4	SGWB-10	SGWK-1	SGWB-5	SGWB-6	SGWB-7	SGWG-1	SGWB-9	SGWB-8	TW-8	TW-9	TW-7	TW-7 DUP	TW-5	TW-3	TW-3 DUP	TW-6	TW-6 DUP	TB
Collection Date					4/21/1997	4/21/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	4/22/1997	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006	9/6/2006
PAHs	**CAS No.**	ug/L			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Acenaphthene	83329	19.0	-	4,200.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**0.066 J**	<5.0	<5.0	<5.0	-	-	<5.0	-	-
Acenaphthylene	208968	52.0	-	3,900.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<5.0	<5.0	<5.0	<5.0	**0.041J**	-	-	<5.0	-	-
Anthracene	120127		43.0		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<5.0	<5.0	<5.0	<5.0	**0.054J**	-	-	<5.0	-	-
Benzo(a)anthracene	56553	2.1	-	9.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.18**	<0.01	<0.01	<0.01	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	-	-
Benzo(a)pyrene	50328	1.0	-	5.0	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	**0.2**	<0.004	<0.004	<0.004	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	-	-
Benzo(b)flouranthene	205992		1.5		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	**0.16**	<0.020	<0.020	<0.020	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	-	-
Benzo(g,h,i)perylene	191242		1.0		<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	**0.34**	<0.60	<0.60	<0.60	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	-	-
Benzo(k)flouranthene	207089		1.0		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**0.08**	<0.10	<0.10	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	-	-
4-Chloro-3-methylphenol	59507	7.4	-	79,000.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-	-	-	-
2-Chlorophenol	95578	22.0	-	94,000.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10.0	<10.0	<10.0	-	-	-	-	-
Chrysene	218019		1.6		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	**0.49**	<0.050	<0.050	<0.050	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	-	-
Dibenzo(a,h)anthracene	53703		2.0		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	**0.09**	<0.020	<0.020	<0.020	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	<2.0	-	-
2,4-Dichlorophenol	120832	19.0	-	48,000.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10.0	<10.0	<10.0	-	-	-	-	-
2,4-Dimethylphenol	105679	370.0	-	5.2E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-	-	-	-
4,6-Dinitro-2-methylphenol	534521	20.0	-	9,500.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20.0	<20.0	<20.0	-	-	-	-	-
2,4-Dinitrophenol	51285	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<25.0	<25.0	<25.0	-	-	-	-	-
Flouranthene	206440	1.6	-	210.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	**0.060 J**	<1.0	<1.0	**0.11J**	-	-	<1.0	-	-
Flourene	86737	12.0	-	2,000.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	**0.034J**	-	-	<5.0	-	-
Indeno(1,2,3,c,d)pyrene	193395		2.0		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	<2.0	-	-
1-methyl Naphthalene	90120	Part 201 Not Applicable			<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	-	-	-	-	-	-	-	-	-	-
2-Methyl Naphthalene	91576	260.0	-	25,000.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<5.0	<5.0	<5.0	<5.0	**0.059J**	-	-	<5.0	-	-
2-Methylphenol	95487	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10.0	<10.0	<10.0	-	-	-	-	-
3,4 Dimethylphenol	95658	10.0	-	18,000.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20.0	<20.0	<20.0	-	-	<20.0	-	-
Naphthalene	91203	13.0	-	31,000.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	**0.055 J**	**0.028 J**	**0.033J**	**0.026J**	**0.076J**	-	-	**0.034J**	-	-
4-Nitrophenol	100027	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<25.0	<25.0	<20.0	-	-	-	-	-
2-Nitrophenol	88755	20.0	-	79,000.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-	-	-	-
Pentachlorophenol	87865	1.0	-	200.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	-	-	-	-	-
Phenanthrene	85018	2.4	-	1,000.0	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<2.0	**0.076 J**	<2.0	<2.0	**0.31J**	-	-	<2.0	-	-
Phenol	108952	210.0	-	2.9E+07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-	-	-	-
Pyrene	129000		140.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	**0.045 J**	<1.0	<1.0	**0.074J**	-	-	<5.0	-	-
2,4,6-Trichlorophenol	88062	4.4	-	10,000.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4.0	<4.0	<4.0	-	-	-	-	-
2,4,5-Trichlorophenol	95954	730.0	-	1.7E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-	-	-	-
PCB's	**CAS No.**	ug/L			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aroclor 1016	12674112	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	< 0.20	-	-
Aroclor 1221	11104282	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	-	-	-
Aroclor 1232	11141165	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	-	-	-
Aroclor 1242	53469219	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	-	-	-
Aroclor 1248	12672296	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	-	-	-
Aroclor 1254	11097691	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	-	-	-
Aroclor 1260	11096825	Part 201 Not Applicable			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.20	< 0.20	-	-	-
Total PCB Conc.	1336363	2.00E-01	-	45.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals	**CAS No.**	mg/L			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	7440382	1.00E-02	-	4.3	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	**0.0022**	**0.0019**	**0.0037**	-	**0.00047J**	**0.025**	**0.026**	<0.001	-	-
Cadmium	7440439	5.00E-03	-	190.0	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	**0.011**	<0.010	<0.010	<0.010	<0.010	**0.00046**	**0.00053**	<0.0002	-	<0.0002	**0.000074J**	**0.00011J**	<0.00020	-	-
Chromium	16065831	1.00E-01	-	2.9E+05	-	-	-	**0.012**	**0.016**	**0.013**	**0.012**	**0.015**	**0.013**	**0.015**	**0.012**	**0.014**	**0.011**	**0.014**	**0.014**	**0.013**	**0.014**	<0.001	<0.001	<0.0010	-	<0.001	<0.001	<0.001	<0.0010	-	-
Copper	7440508	1.96E-02	-	7,400.0	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	**0.026**	**0.022**	**0.0044**	-	**0.00080J**	**0.00065J**	**0.00071J**	**0.00095J**	-	-
Lead	7439921		4.00E-03		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.0054**	**0.021**	**0.0034**	-	**0.00067J**	**0.00062J**	**0.00063J**	**0.00064J**	-	-
Mercury	7439976	1.30E-06	-	5.60E-02	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.00021**	**0.00069**	**0.000037J**	-	<0.0002	<0.0002	<0.00020	<0.0002	-	-
Selenium	7782492	5.00E-03	-	970.0	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.001	<0.001	<0.001	-	<0.001	<0.004	<0.0010	**0.00096J**	-	-
Zinc	7440666	2.4	-	1.1E+05	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.05**	**0.18**	**0.011**	-	**0.013**	**0.0076**	**0.011**	**0.0065**	-	-

Table 4-1
Phase I Groundwater Monitoring Network
Monitoring Well Location Rationale

PRINCIPAL STUDY QUESTIONS	PRIOR DATA ASSESSMENT	AREA OF POTENTIAL ENVIRONMENTAL CONCERN	PAST DATA COLLECTION IN AREA	GROUNDWATER	BASIS FOR WELL LOCATIONS
1. Does groundwater downgradient of potential source areas pose a potential unacceptable risk and/or exceed applicable State of Michigan Part 201 criteria under current and reasonably anticipated future land uses? 2. What is the interrelationship of the groundwater and river flow systems? 3. What are the saturated soils' physical characteristics? 4. Does groundwater at the site pose a potential unacceptable risk under current and reasonably anticipated future land uses?	Groundwater data reported to date suggest that the site operations had limited adverse impact on groundwater quality. However, since the groundwater samples previously collected on the site were taken from temporary wells and were not collected under a QAPP, the groundwater quality is uncertain for the purposes of risk assessment and comparison to ARARs. Hydrogeologic characteristics were not well established during the previous investigations. Primary issues include the interface of the groundwater system with the river system; the direction of groundwater gradient; the relationship between on-site fill and residuals and the water table; the amount, type, and locations of non-natural fill material; and the variability of the subsurface soil conditions.	Mill Buildings Area	Nine temporary monitoring wells were installed in this area in 1997 (seven) and 2006 (two). Previous reports indicate that the wells were installed in shallow groundwater. The 2006 wells were installed with 5-foot screens ranging from 6 to 15 feet below ground surface (bgs) in this area. VOCs were not detected in seven of the nine wells: PAHs were not detected in six of nine wells and below criteria at the remaining locations. Metals above possible criteria in at least one location were cadmium, copper, lead, mercury, and zinc.	***Determination of shallow groundwater quality and flow characteristics (five wells) and two river stage gages (SG-1 and SG-2)*** – Install five wells (MW-1 upgradient; MW-2 near the coal conveyance tunnel; and MW-3, MW-4, and MW-5 downgradient). Collect and analyze samples for metals, PCBs, PAHs, and VOCs. Determine hydraulic conductivity and gradient. Oil samples will be collected if free product is observed. Stage gages to be located adjacent to MW-4 and in the Mill Race near Allegan Street.	***MW-1*** – Upgradient of Mill Buildings and site/downgradient of city neighborhood. ***MW-2*** – Downgradient of coal conveyance tunnel. ***MW-3*** – Downgradient of former transformer pad near area of observed oil sheen. ***MW-4*** – Downgradient of building coal tunnel, former drum storage area. ***MW-5*** – Downgradient of fuel oil AST and buildings, near several outfalls. ***SG-1*** – Adjacent to Allegan Street, in the Mill Race, to assess relationship between river and groundwater elevations. ***SG-2*** – Adjacent to MW-4, in the Kalamazoo River, to assess relationship between river and groundwater elevations.
		Northcentral Portion of the Site	Ten temporary monitoring wells were installed in this area in 1997 (seven) and 2006 (three). Previous reports indicate that the wells were installed in shallow groundwater. The 2006 wells were installed with 5-foot screens ranging from 8 to 15 feet bgs in this area. VOCs were not detected and all PAH detections were below quantitation limits and Part 201 criteria. Chromium and mercury were detected, but only mercury was above possible criteria at a single location.	***Determination of shallow groundwater quality and flow characteristics (three wells)*** – Install MW-6 upgradient and MW-7 and MW-8 downgradient). Collect and analyze samples for metals, PCBs, PAHs, and VOCs. Estimate hydraulic conductivity and gradient. Oil samples will be collected if free product is observed.	***MW-7*** – Downgradient of coal pile area and Specialty Minerals. ***MW-8*** – Near elevated PCB concentrations, downgradient of coal piles and Specialty Minerals.
		Former Wastewater Sludge Dewatering Lagoons and Aeration Basin Area	Three temporary monitoring wells were installed and sampled; two in 1997 and one in 2006. Previous reports indicate that the wells were installed in shallow groundwater. The 2006 well was installed with a 5-foot screen at approximately 8 to 13 feet bgs. Dissolved chromium was detected in 1997 and arsenic above the Part 201 criteria in 2006.	***Determination of shallow groundwater quality and flow characteristics (four wells) and one stage gage (SG-3)*** – Install MW-9 upgradient and MW- 10, MW-11, and MW-12 downgradient of the former wastewater treatment plant. Collect and analyze samples for metals, PCBs, PAHs, and VOCs. Estimate hydraulic conductivity and gradient. Oil samples will be collected if free product is observed. Stage gage to be located adjacent to MW-12.	***MW-10*** – Downgradient of former aeration basin. ***MW-11*** – Downgradient of selected former lagoon with documented remaining residuals (K and C). ***MW-12*** – Downgradient of selected former lagoon with documented remaining residuals (H, I, J, L, M, and N). ***SG-3*** – Adjacent to MW-12 to assess relationship between the Kalamazoo River and groundwater elevations further downstream.
		Undeveloped Areas of the Site	No samples have been taken in these areas.	***Determination of shallow groundwater quality and flow characteristics (two wells)*** – MW-6 and MW-9.	***MW-6*** – Upgradient of north central area/downgradient of city neighborhood. ***MW-9*** – Upgradient of wastewater treatment plant area and downgradient of city commercial district (dry cleaner and gasoline station).



LEGEND

PROPERTY BOUNDARIES

0 1,000 2,000 4,000 FEET

1 INCH = 1,600 FEET

1:19,200

N

PROJECT LOCATION

BASE MAP FROM USGS 7.5 MINUTE QUADRANGLE, OSTEGO, 1967, REVISED 1973.

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SITE LOCATION MAP

DRAFT RI/FS WORK PLAN
PLAINWELL MILL
PLAINWELL, MICHIGAN

DRAWN BY:	PAPEZ J
APPROVED BY:	LEH
PROJ. NO.:	00-05121.03
FILE NO.:	51210306.mxd
DATE:	SEPTEMBER 2006

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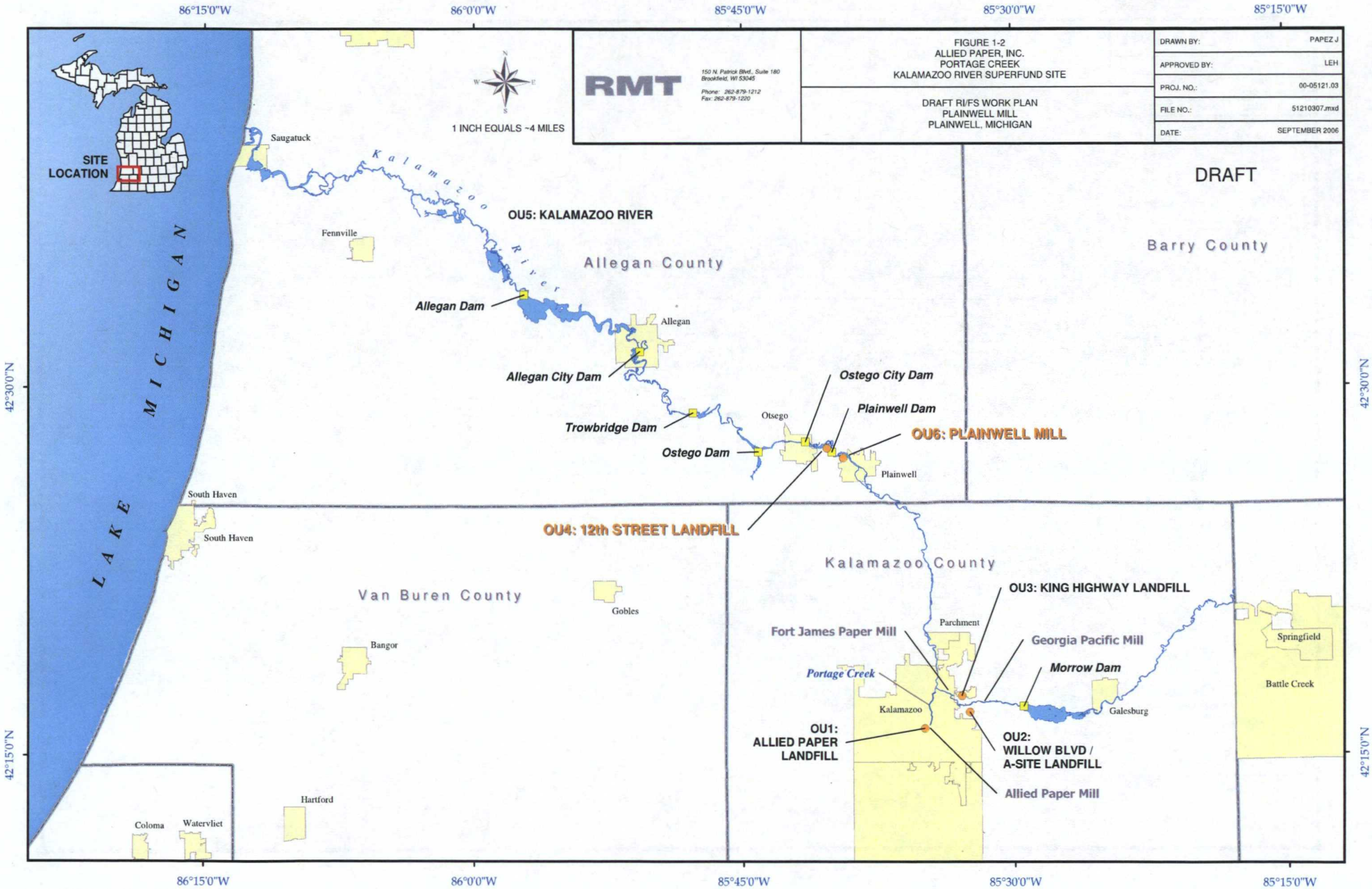
FIGURE 1-1



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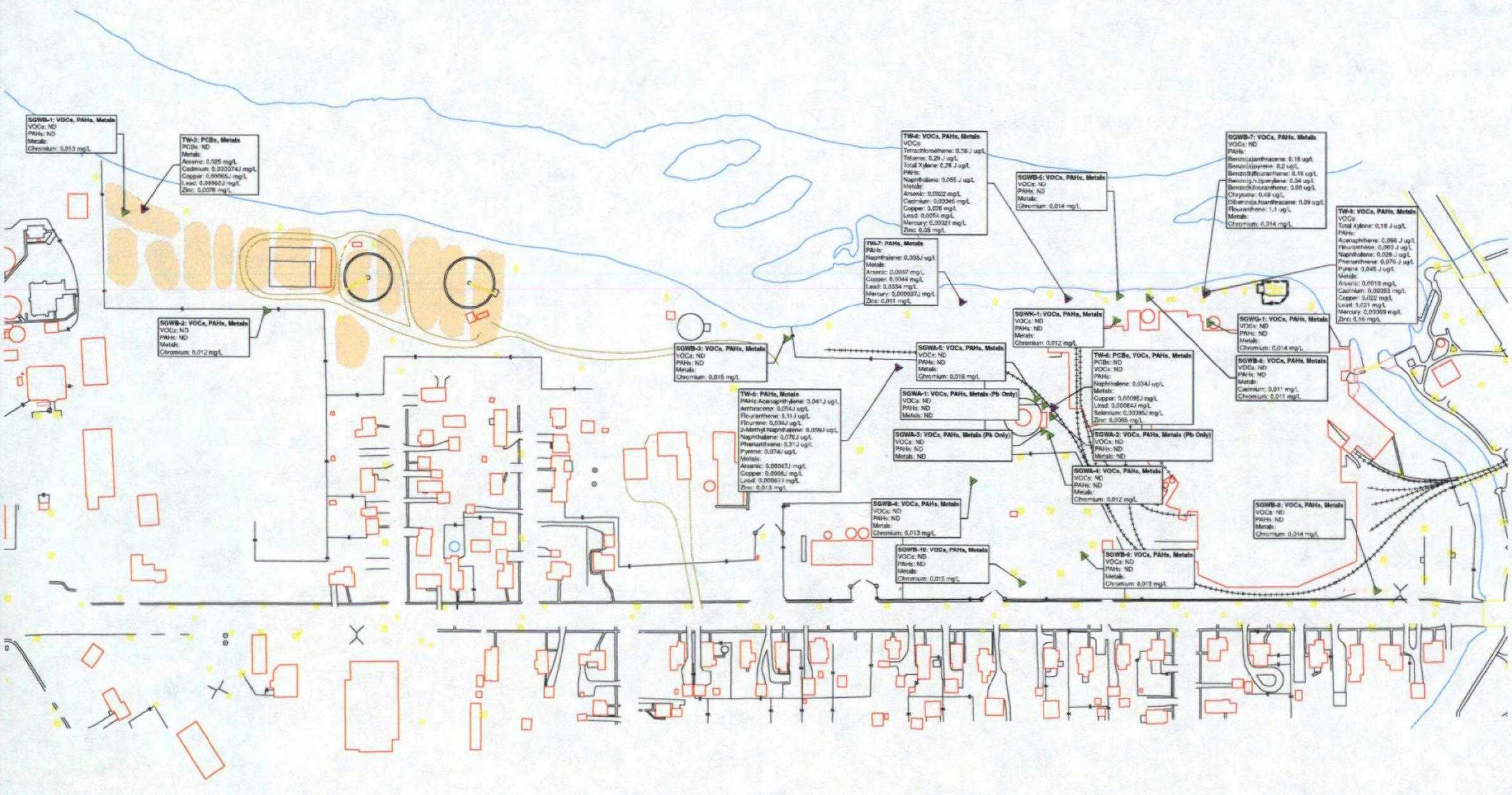

LEGEND

- ▲ ERM Phase II - Groundwater Data - 1997
- ▲ FTCH Phase II - Groundwater Data - 2006
- Former Dewatering Lagoons

NOTES:

1. "J" FLAGGED DATA INDICATES AN ANALYTICAL RESULT GREATER THAN THE DETECTION LIMIT, BUT LESS THAN THE QUANTITATION LIMIT
2. APPENDIX A CONTAINS THE HISTORICAL GROUNDWATER DATA TABLES

0 100 200 FEET

1 " = 116.67 '
1:1,400

PROJECT	WEYERHAEUSER COMPANY PLAINWELL MILL - OU7 PHASE I - GROUNDWATER WORK PLAN		
SHEET TITLE	HISTORIC GROUNDWATER DATA FOR THE PLAINWELL MILL		
DRAWN BY: WEBERTI	SCALE: DRAFT	PROJ. NO.	00-05139.05
CHECKED BY: LEMLEYB		FILE NO.	51306Fig1.mxd
APPROVED BY	DATE PRINTED	FIGURE 3-1	
DATE: OCTOBER 2006	7/07/2006		

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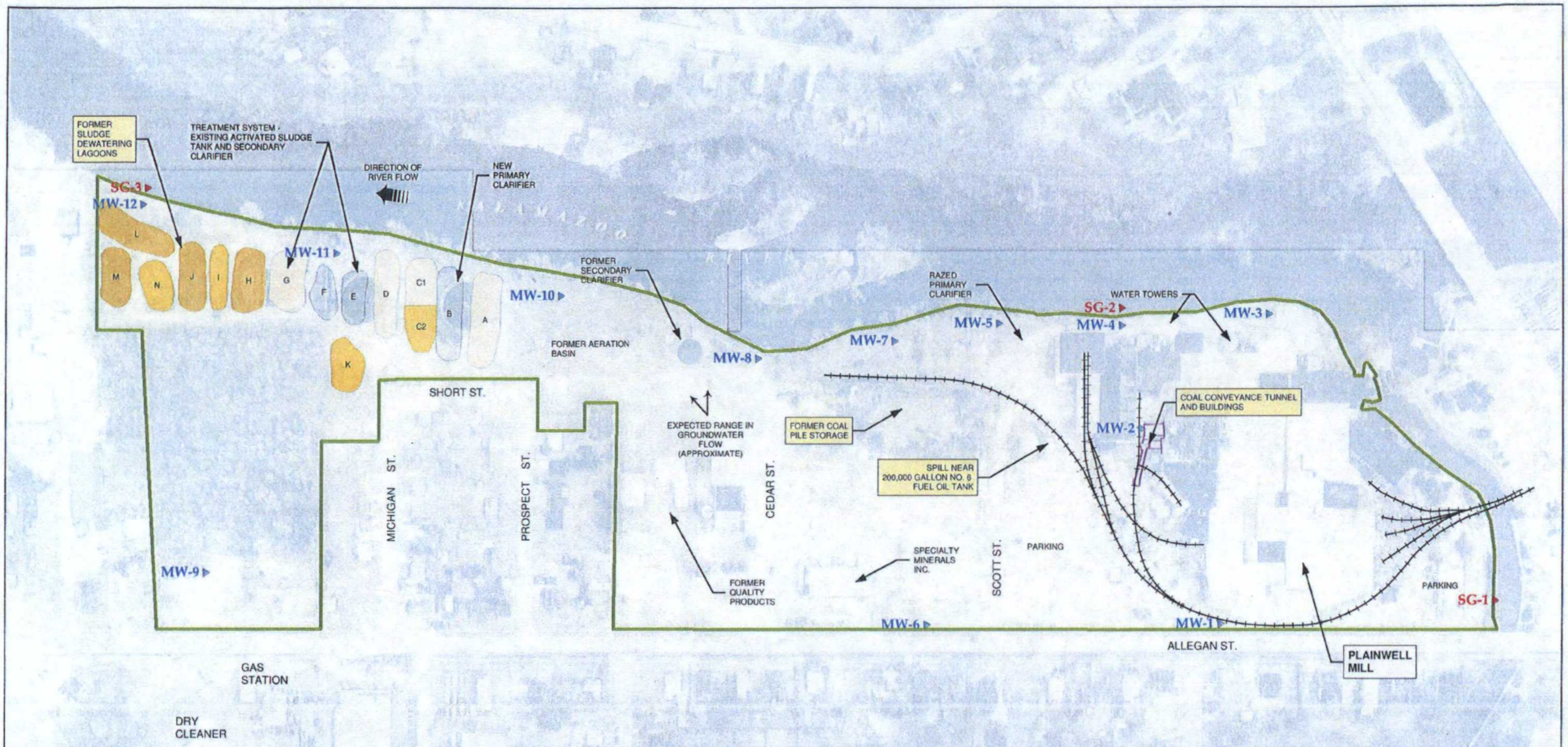

LEGEND

▲ RI/FS PROPOSED GROUNDWATER MONITORING WELLS

▲ RI/FS PROPOSED STAFF GAGES

FORMER WASTEWATER SLUDGE DEWATERING LAGOONS

TOTAL THICKNESS (FT) OF RESIDUALS AND/OR FILL MATERIAL

- UP TO 4'
- 4' - 8'
- 8' +
- UNKNOWN DEPTH

APPROXIMATE PROPERTY LINE (SURVEYED BY FTC&H ON 11/09/2005)

N

0 50 100 200 FEET

1:2,400

1 inch = 200 feet

NOTES

1. AERIAL PHOTOGRAPH FROM OAS, INC. (MARCH 30, 2005).
2. FORMER SLUDGE DEWATERING LAGOONS INTERPRETED FROM AERIAL PHOTOGRAPHS (1955, 1960, 1967, 1974, 1981, 1986, AND 1991) (BBL, 1992).
3. PROPERTY BOUNDARY TRANSFORMED APPROXIMATELY TO MICHIGAN STATE PLANE COORDINATE SYSTEM IN ORDER TO MATCH OTHER DATA SETS.
4. GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MAY BE ADJUSTED
5. THICKNESS OF MATERIAL PRESENT IN THE FORMER SLUDGE DEWATERING LAGOONS WAS OBTAINED FROM VARIOUS BORING LOGS COMPLETED BY BBL (1996) AND ERM (1997).

PROJECT: WEYERHAEUSER COMPANY PLAINWELL MILL - OU7			
SHEET TITLE: PHASE 1 - PLAINWELL MILL RI/FS GROUNDWATER ASSESSMENT MONITORING WELL AND STAFF GAGE LOCATIONS			
DRAWN BY: WEBERN	SCALE: DRAFT	PROJ. NO.: 00-05133.05	
CHECKED BY:		FILE NO.: 513305.Fig4_1.mxd	
APPROVED BY:	DATE PRINTED: 10/8/2008	FIGURE 4-1	
DATE: OCTOBER 2008			

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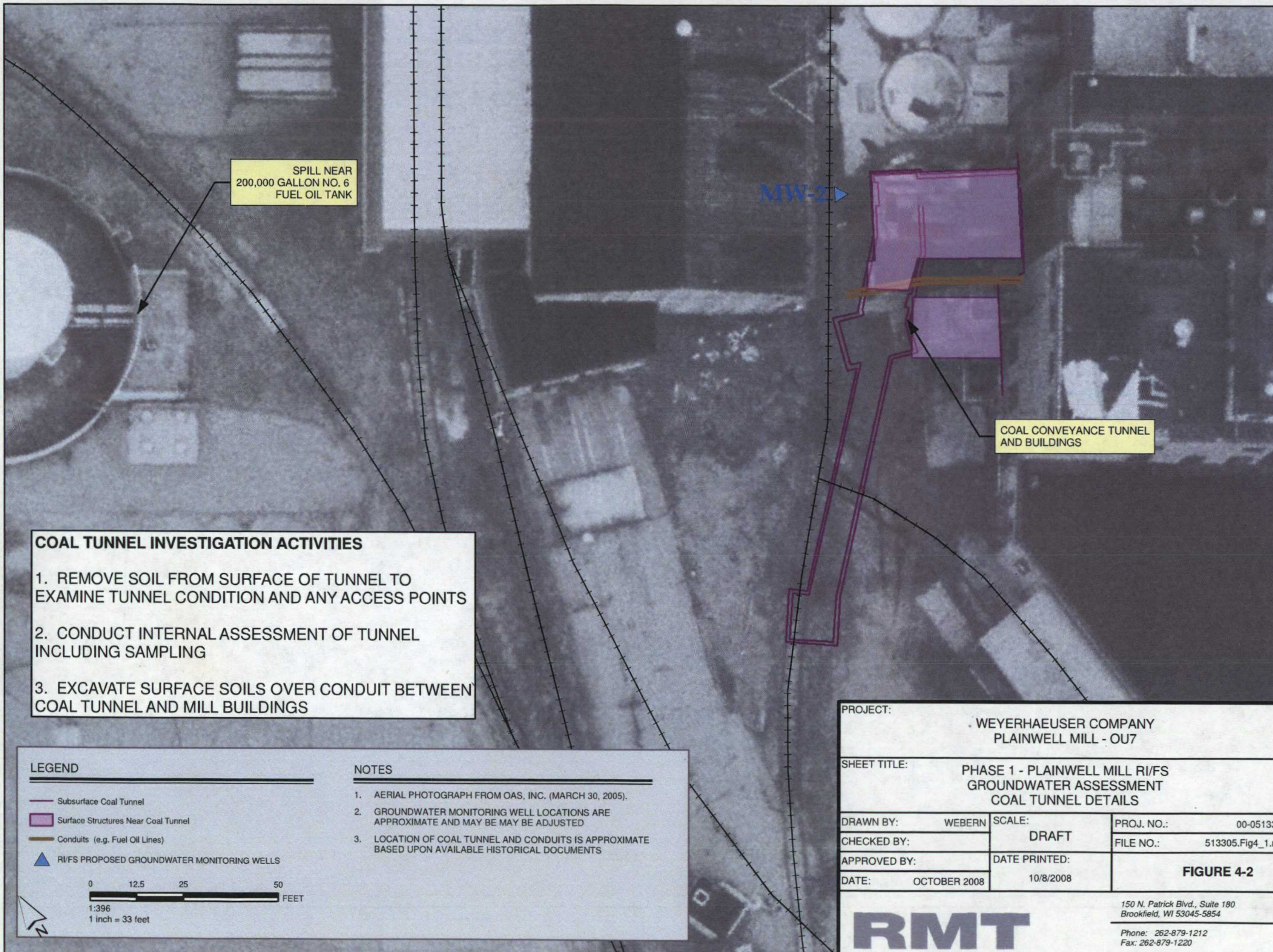

COAL TUNNEL INVESTIGATION ACTIVITIES

1. REMOVE SOIL FROM SURFACE OF TUNNEL TO EXAMINE TUNNEL CONDITION AND ANY ACCESS POINTS

2. CONDUCT INTERNAL ASSESSMENT OF TUNNEL INCLUDING SAMPLING

3. EXCAVATE SURFACE SOILS OVER CONDUIT BETWEEN COAL TUNNEL AND MILL BUILDINGS

LEGEND

- Subsurface Coal Tunnel
- Surface Structures Near Coal Tunnel
- Conduits (e.g. Fuel Oil Lines)
- RI/FS PROPOSED GROUNDWATER MONITORING WELLS

0 12.5 25 50 FEET
1:396
1 inch = 33 feet

NOTES

1. AERIAL PHOTOGRAPH FROM OAS, INC. (MARCH 30, 2005).
2. GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MAY BE ADJUSTED
3. LOCATION OF COAL TUNNEL AND CONDUITS IS APPROXIMATE BASED UPON AVAILABLE HISTORICAL DOCUMENTS

PROJECT:
WEYERHAEUSER COMPANY
PLAINWELL MILL - OU7

SHEET TITLE:
PHASE 1 - PLAINWELL MILL RI/FS
GROUNDWATER ASSESSMENT
COAL TUNNEL DETAILS

DRAWN BY: WEBERN	SCALE:	PROJ. NO.: 00-05133.05	
CHECKED BY:	DRAFT	FILE NO.: 513305.Fig4_1.mxd	
APPROVED BY:	DATE PRINTED:	FIGURE 4-2	
DATE: OCTOBER 2008	10/8/2008		

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